

Reply to Office Action of December 07, 2005
Amendment Dated: February 14, 2006

Appl. No.: 09/910,936
Attorney Docket No.: CSCO-006/2879

Listing of Claims

1 **Claim 1 (Currently Amended):** A method of processing a packet in a gateway device
2 comprising a plurality of physical ports, each of said plurality of physical ports being coupled
3 to a corresponding one of a plurality of communication paths providing connection with a
4 corresponding network, said method comprising:
5 providing a search utility in said gateway, said search utility enabling the retrieval of
6 both a forwarding information and a network address translation (NAT) information
7 necessary for processing said packet in a single search operation, wherein said NAT
8 information specifies a new address for an original address in said packet, said forwarding
9 information specifying one of said plurality of physical ports for forwarding said packet;
10 receiving said packet containing said original address;
11 determining said forwarding information and said NAT information for said packet
12 in a single search operation by using said search utility;
13 substituting said new address for said original address in said packet; and
14 forwarding said packet with said new address on the specified one of said plurality of
15 physical ports according to said forwarding information.

1 **Claim 2 (Previously Amended):** The method of claim 1, wherein said providing
2 comprises maintaining a single table for both said forwarding information and said NAT
3 information.

1 **Claim 3 (Previously Amended):** The method of claim 2, wherein said maintaining
2 comprises storing said single table in a content addressable memory (CAM) indexed by a
3 source address and a destination address, wherein said determining comprises providing the
4 source address and destination address in said packet as a key to said CAM to retrieve said
5 forwarding information and said NAT information.

1 **Claim 4 (original):** The method of claim 3, wherein said CAM comprises a multi-
2 way CAM.

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1 **Claim 5 (Previously Amended):** The method of claim 2, wherein said gateway
2 device comprises a service selection gateway (SSG) connecting a plurality of remote systems
3 to a plurality of service domains, wherein one of said original address and said new address
4 comprises a local address of a remote system and the other address comprises an external
5 address in a service domain for said remote system, said maintaining further comprises:
6 storing NAT information and forwarding information in a plurality of tables
7 partitioned according to service domains such that forwarding information and NAT
8 information related to the same service domain is stored in the same one of said plurality of
9 tables.

1 **Claim 6 (Previously Amended):** The method of claim 5, wherein at least one of said
2 plurality of tables stores NAT information and forwarding information related to at least a
3 first service domain and a second service domain contained in said plurality of service
4 domains, said first service domain and said second service domain respectively containing
5 a first set of addresses and a second set of addresses accessible from said gateway device,
6 wherein said first set of addresses and said second set of addresses do not overlap.

1 **Claim 7 (Original):** The method of claim 1, wherein said forwarding information
2 comprises an interface on said gateway device, wherein said forwarding comprises sending
3 said packet on said interface, wherein said packet is received in the form of an Internet
4 Protocol (IP) packet.

1 **Claim 8 (Currently Amended):** A gateway device for processing a packet, said
2 gateway device comprising:
3 a plurality of physical ports, each of said plurality of physical ports being coupled
4 to a corresponding one of a plurality of communication paths providing connection with a
5 corresponding network;
6 means for searching enabling the retrieval of both a forwarding information and a
7 network address translation (NAT) information necessary for processing said packet in a
8 single search operation, wherein said NAT information specifies a new address for an

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9 original address in said packet, and said forwarding information specifying one of said
10 plurality of physical ports for forwarding said packet;
11 means for receiving said packet containing said original address;
12 means for determining said forwarding information and said NAT information for
13 said packet by using said single search;
14 means for substituting said new address for said original address in said packet;
15 and
16 means for forwarding said packet with said new address on the specified one of said
17 plurality of physical ports according to said forwarding information.

1 **Claim 9 (Previously Amended):** The gateway device of claim 8, wherein said means
2 for searching maintains a single table for both said forwarding information and said NAT
3 information

1 **Claim 10 (Previously Amended):** The gateway device of claim 9, wherein a memory
2 means stores said single table in a content addressable memory (CAM) indexed by a source
3 address and a destination address, wherein said means for determining comprises means for
4 providing the source address and destination address in said packet as a key to said CAM to
5 retrieve said forwarding information and said NAT information.

1 **Claim 11 (Original):** The gateway device of claim 10, wherein said CAM comprises
2 a multi-way CAM, said packet comprises an IP packet, and said forwarding information
3 comprises an interface on said gateway device, wherein said means for forwarding sends said
4 packet on said interface.

1 **Claim 12 (Previously Amended):** The gateway device of claim 10, wherein said
2 gateway device comprises a service selection gateway (SSG) connecting a plurality of remote
3 systems to a plurality of service domains, wherein one of said original address and said new
4 address comprises a local address of a remote system and the other address comprises an
5 external address in a service domain for said remote system, said memory means stores NAT
6 information and forwarding information in a plurality of tables partitioned according to

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7 service domains such that forwarding information and NAT information related to the same
8 service domain is stored in the same one of said plurality of tables.

1 **Claim 13 (Previously Amended):** The gateway device of claim 12, wherein at least
2 one of said plurality of tables stores NAT information and forwarding information related to
3 at least a first service domain and a second service domain contained in said plurality of
4 service domains, said first service domain and said second service domain respectively
5 containing a first set of addresses and a second set of addresses accessible from said gateway
6 device, wherein said first set of addresses and said second set of addresses do not overlap.

1 **Claim 14 (Currently Amended):** A computer readable medium carrying one or more
2 sequences of instructions for causing a gateway device to process a packet, said gateway
3 device comprising a plurality of physical ports, each of said plurality of physical ports being
4 coupled to a corresponding one of a plurality of communication paths providing connection
5 with a corresponding network, wherein execution of said one or more sequences of
6 instructions by one or more processors contained in said gateway device causes said one or
7 more processors to perform the actions of:

8 providing a search utility in said gateway, said search utility enabling the retrieval
9 of both a forwarding information and a network address translation (NAT) information
10 necessary for processing said packet in a single search operation, wherein said NAT
11 information specifies a new address for an original address in said packet and said
12 forwarding information specifies one of said plurality of physical ports for forwarding
13 said packet;

14 receiving said packet containing said original address;

15 determining said forwarding information and said NAT information for said
16 packet in a single search operation by using said search utility;

17 substituting said new address for said original address in said packet; and

18 forwarding said packet with said new address on the specified one of said plurality of
19 physical ports according to said forwarding information.

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1 **Claim 15 (Previously Amended):** The computer readable medium of claim 14,
2 wherein said providing comprises maintaining a single table for both said forwarding
3 information and said NAT information.

1 **Claim 16 (Previously Amended):** The computer readable medium of claim 15,
2 wherein said maintaining comprises storing said single table in a content addressable
3 memory (CAM) indexed by a source address and a destination address, wherein said
4 determining comprises providing the source address and destination address in said packet
5 as a key to said CAM to retrieve said forwarding information and said NAT information.

1 **Claim 17 (original):** The computer readable medium of claim 16, wherein said CAM
2 comprises a multi-way CAM and said packet is received in the form of an IP packet.

1 **Claim 18 (Previously Amended):** The computer readable medium of claim 15,
2 wherein said gateway device comprises a service selection gateway (SSG) connecting a
3 plurality of remote systems to a plurality of service domains, wherein one of said original
4 address and said new address comprises a local address of a remote system and the other
5 address comprises an external address in a service domain for said remote system, said
6 maintaining further comprises:
7 storing NAT information and forwarding information in a plurality of tables
8 partitioned according to service domains such that forwarding information and NAT
9 information related to the same service domain is stored in the same one of said plurality of
10 tables.

1 **Claim 19 (Previously Amended):** The computer readable medium of claim 18,
2 wherein at least one of said plurality of tables stores NAT information and forwarding
3 information related to at least a first service domain and a second service domain contained
4 in said plurality of service domains, said first service domain and said second service domain
5 respectively containing a first set of addresses and a second set of addresses accessible from
6 said gateway device, wherein said first set of addresses and said second set of addresses do
7 not overlap.

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1 **Claim 20 (Currently Amended):** A gateway device for processing a packet, said
2 gateway device comprising:
3 a plurality of physical ports, each of said plurality of physical ports being coupled to
4 a corresponding one of a plurality of communication paths providing connection with a
5 corresponding network;
6 a memory unit storing a forwarding information and a network address translation
7 (NAT) information necessary for processing said packet, wherein said NAT information
8 specifies a new address for an original address in said packet, and said forwarding
9 information specifying one of said plurality of physical ports for forwarding said packet;
10 an inbound interface receiving said packet containing said original address;
11 a forwarding and NAT block determining said forwarding information and said NAT
12 information for said packet using a single search, said forwarding and NAT block substituting
13 said new address for said original address in said packet; and
14 an outbound interface forwarding said packet with said new address on the specified
15 one of said plurality of physical ports according to said forwarding information.

1 **Claim 21 (Previously Amended):** The gateway device of claim 20, wherein said
2 memory unit stores said forwarding information and said NAT information in a single table.

1 **Claim 22 (Previously Amended):** The gateway device of claim 21, wherein said
2 memory unit comprises a content addressable memory (CAM) indexed by a source address
3 and a destination address, wherein said forwarding and NAT block sends the source address
4 and destination address in said packet as a key to said CAM to retrieve said forwarding
5 information and said NAT information.

1 **Claim 23 (original):** The gateway device of claim 22, wherein said CAM comprises
2 a multi-way CAM and said packet comprises an IP packet.

1 **Claim 24 (Previously Amended):** The gateway device of claim 21, wherein said
2 gateway device comprises a service selection gateway (SSG) connecting a plurality of remote

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3 systems to a plurality of service domains, wherein one of said original address and said new
4 address comprises a local address of a remote system and the other address comprises an
5 external address in a service domain for said remote system, wherein said memory unit stores
6 NAT information and forwarding information in a plurality of tables partitioned according
7 to service domains such that forwarding information and NAT information related to the
8 same service domain is stored in the same one of said plurality of tables.

1 **Claim 25 (Previously Amended):** The gateway device of claim 24, wherein at
2 least one of said plurality of tables stores NAT information and forwarding information
3 related to at least a first service domain and a second service domain contained in said
4 plurality of service domains, said first service domain and said second service domain
5 respectively containing a first set of addresses and a second set of addresses accessible
6 from said gateway device, wherein said first set of addresses and said second set of
7 addresses do not overlap.

1 **Claim 26 (original):** The gateway device of claim 25, further comprising a service
2 selection block determining a specific service to which said packet relates to and causes
3 said packet to be processed according to a corresponding one of said plurality of tables.

1 **Claim 27 (Previously Amended):** The gateway device of claim 26, further
2 comprising a plurality of forwarding and NAT blocks wherein each of said plurality of
3 forwarding and NAT blocks is coupled to a corresponding one of a plurality of memory
units, wherein each of said plurality of memory units stores one of said plurality of tables.